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ABSTRACT

In November 2001 the National Oceanic and Atmospheric Administration (NOAA) hosted the third NOAA and Academia Partnership to evaluate, maintain, and expand on efforts to optimize NOAA-university cooperation. Close partnership between the NOAA and U.S. universities has produced many benefits for the U.S. economy and the environment. Based on the meeting itself and subsequent feedback, the Conference Steering Committee identified a general recommendation on the National Oceanic and Atmospheric Administration (NOAA) Strategic Plan. The general recommendation is that research and education should be recognized as part of the core mission of NOAA and the partnership with the academic community should be recognized as one of the principal means of fulfilling NOAA's mission. These priority issues were identified: (1) improve observation prediction capabilities and dissemination of data; (2) formalize education and outreach as a core NOAA mission area; (3) streamline and modernize data management and dissemination; (4) utilize a broader approach to ecosystems and living marine resources; and (5) explore new opportunities and evaluate current partnership efforts for centers of excellence. The report also summarizes the sessions of the conference. The importance of public outreach and education to both the general public as well as decision makers at all levels emerged as a top priority in all four sessions. (SLD)

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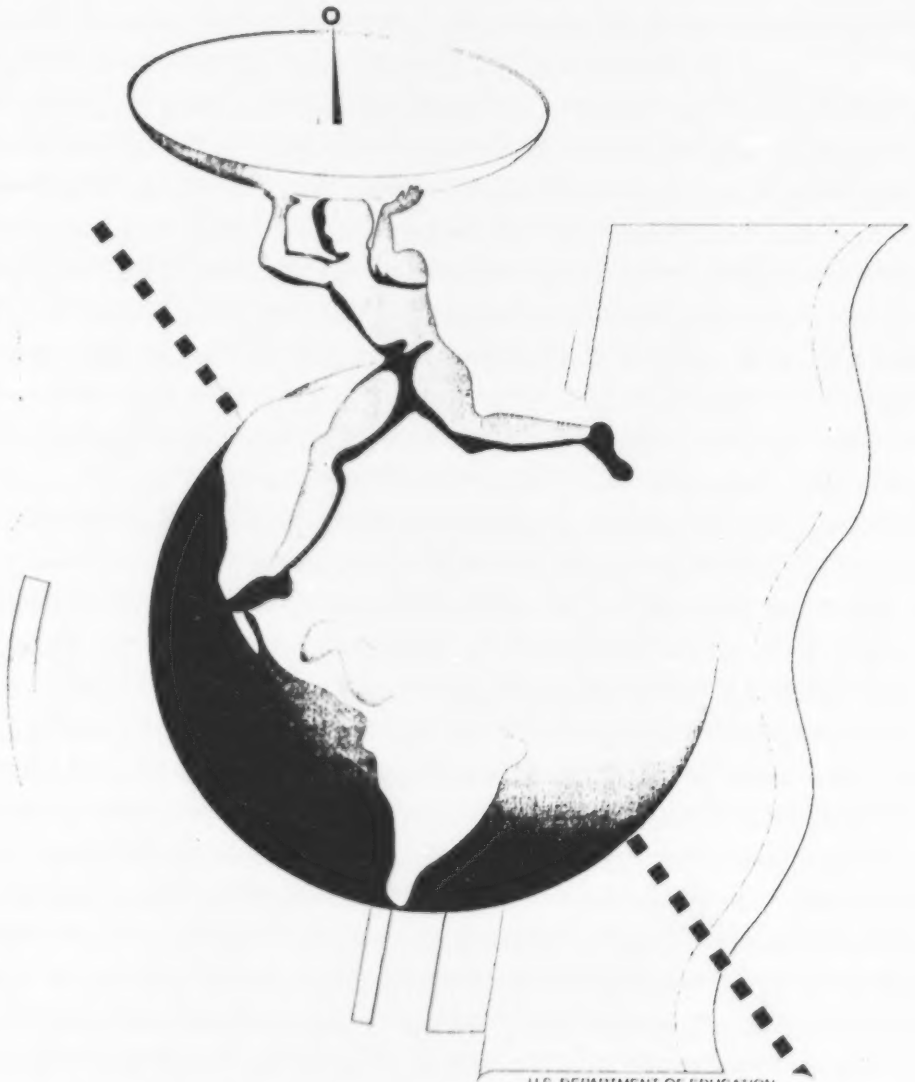
HIGHLIGHTS

NOAA & Academia Partnership Building Conference



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Introduction

On November 14 and 15, 2001, NOAA hosted the third NOAA & Academia Partnership Conference in Washington, D.C. The aim of the meeting was to evaluate, maintain, and expand upon efforts to optimize NOAA-university cooperation, addressing the primary sources of concern in the relationship and identifying solutions.

The National Oceanic and Atmospheric Administration's mission is to describe and predict changes in the Earth's environment, and conserve and manage wisely the Nation's coastal and marine resources to ensure sustainable opportunities. This mission is only accomplishable through the successful collaboration between NOAA, universities, the private sector and user-groups. Close partnership between NOAA and the Nation's universities has produced many benefits for the American economy and the environment.

Recommendations on Priorities

Based on the meeting itself and subsequent feedback, the Conference Steering Committee has identified a general recommendation on the NOAA Strategic Plan and five priority issues.

General Recommendation

As the NOAA Strategic Plan is updated and revised, we urge that two general principles be incorporated across the body of the plan:

A. Research and Education should be recognized as part of the core mission of NOAA.

B. The partnership with the academic community should be recognized as one of the principal means toward fulfilling NOAA's mission.

Priority Issues

Although many topics and themes were identified during the course of the conference, five areas have been identified as crosscutting priorities that emerged from the workshop groups:

1. ***Improve observation prediction capabilities and dissemination of data:*** Integrating observing and modeling systems with environmental prediction and analysis is vital for reaching NOAA's mission, and academic expertise is an invaluable resource for technology infusion.

2. ***Formalize education and outreach as a core NOAA mission area:*** The future of NOAA is dependent on the investment to improve the professional development of NOAA's workforce. Raising awareness by the public and user-groups of NOAA's significance to environmental stewardship must include the full range of NOAA's capabilities. Sea Grant was repeatedly lauded as a good example of outreach and extension efforts that must be expanded on, and the re-instatement of the Education Office was a recurrent suggestion for providing a focal point of contact between academia and NOAA.

3. ***Streamline and modernize data management and dissemination:*** A cooperative initiative by NOAA, other governmental and university partners is needed to make data easily distributed and accessible. Data need to be made widely available to support policy decisions relating to climate change, marine ecosystem management and the development of clean and non-disruptive energy resources to ensure human health and the nation's economic well-being.

4. ***Utilize a broader approach to ecosystems and living marine resources:*** NOAA should adopt the ecosystem-based approach from watersheds to the ocean bottom, taking advantage of strong input from academic institutions and state governments to determine the value of resources, protect bio-diversity and consider the human component of environmental impacts.

5. ***Explore new opportunities and evaluate current partnership efforts for centers of excellence:*** An increased collaboration between institutes and centers of excellence currently in place and the implementation of new cooperative agreements are imperative to ensure expedient transfer of scientific and intellectual capacity.

For each of the items above specific actions have been identified in the conference report compiled by Lynne Carbone & Associates, in the section entitled "Integrated Action Plan."

Conference Results

As a follow-up to a successful conference in 1996, the NOAA Science Advisory Board planned a forum for NOAA and the academic community to meet in Washington, D.C. on November 13–14 to *continue to advance the partnership through agreement on shared priorities and focused joint actions.*

The conference was structured with four thematic workshops designed to be highly collaborative and focused on clarifying goals, strategies and ultimate agreement on necessary joint actions. Each was co-led by a NOAA and Academia partner. The four sessions and co-leads included:

Defining the Partnership

Identify emerging opportunities and mechanisms needed to support ongoing success. Co-Leads: John Snow, College of Geosciences, University of Oklahoma; Lee Dantzler, NOAA/NESDIS/NODC

Future Strategic Direction and Joint Priorities

Articulate desired long-term results, clearly articulating the roles of NOAA/Academia, and identifying targeted opportunities. Co-Leads: Louie Echols, Washington Sea Grant Program, University of Washington; Margaret Davidson, Assistant Administrator, NOS

Ocean, Atmospheric, Hydrologic Observing, Prediction and Characterization System

Articulate a vision, products and services, relative roles and focused priorities. Co-Leads: Len Pietrafesa, North Carolina State University; Ants Leetmaa, Geophysical Fluids Dynamics Laboratory, OAR

NOAA Workforce for the 21st Century

Explore and identify needs in recruitment, retention, education, training and partnership efforts to support each. Co-Leads: Marvin Geller, Marine Sciences Research Center, SUNY Stony Brook; Zane Schauer, Human Resources, NOAA

The Importance of the NOAA/Academic Partnership

The conference began with opening remarks by Samuel W. Bodman, Deputy Secretary, Department of Commerce. Recently appointed to the department, Bodman offered very strong support for the importance of the close links and collaboration of NOAA and academia. He conveyed the President's passionate commitment to education, particularly preparing future generations for environmental and commercial challenges. Bodman applauded efforts to continuously evaluate the partnership and find ways to effectively capitalize on joint strengths.

Scott Gudes, Acting Administrator of NOAA, offered a very personal touch concerning the value of the partnership by highlighting specific examples of partnership successes and the individuals who represent the positive relationship. He noted the seamless nature of the union with many examples of scientists and others who have moved from universities to NOAA and vice versa and truly "put faces" to the partnership.

Gudes highlighted the extent to which partnerships permeate NOAA. He noted that academic partnerships are about bringing together the greatest minds in the country and capitalizing the synergy that comes from the union.

John Snow, Dean of Geosciences, University of Oklahoma, emphasized the importance of the NOAA/Academia Partnership to the joint science mission. He highlighted the value of previous meetings and the need for a continued commitment to find ways to make the partnership most effective.

Al Beeton, Chairman of the NOAA Science Advisory Board, shared highlights of progress that has been made in the partnership since the October 1996 Conference. His remarks summarized the Undersecretary's commitment in 1996 and subsequent accomplishments in: administrative efficiency, human resources, strategic planning, research vessels/UNOLS, Coastal Stewardship Task Force and establishing a Science Advisory Board.

Many advances have been made because of the partnership efforts. Beeton reminded the audience of the need to understand each other's needs and constraints in order to solidify strong partnerships.

A very positive tone was set at the outset of the conference, challenging participants to work closely in their respective sessions to collaborate, explore possibilities and most importantly focused together on priorities and plans. In order to ensure maximum collaboration and tangible results, the conference coordinators enlisted the services of professional conference planners and facilitators, Lynne Carbone & Associates, Inc.

The following summary highlights the deliberations and conclusions of each collaborative workshop.

Summary of Thematic Sessions

Each session was co-chaired by a NOAA/Academic partner. The co-chairs were responsible for providing leadership in each session, presenting the results in the conference plenary and ultimately serving as members of a cross -workshop integration team, preparing the final set of recommendations for the Science Advisory Board consideration and joint action.

The following results were offered in the conference plenary session on November 14th.

Session 1: Defining the Partnership

The Defining the Partnership Session offered the fundamental definition and description of the desirable scientific research relationship between NOAA and universities. Workshop participants provided partnership foundation points, including an overarching definition, a delineation of the benefits of the partnership and features of a successful partnership.

A partnership is a well-defined, outcome-explicit relationship that is mutually beneficial to all parties. The achievement of the partnership goals requires the active participation of all parties.

Successful partnerships:

- Achieve joint scientific objectives.
- Increase critical mass for a project.
- Provide high quality expertise with fewer people.
- Provide flexibility in funding.
- Contribute to building future scientific workforce.
- Lower costs to each party in achievement of common goals.
- Provide new research opportunities.
- Contribute to fulfilling NOAA's commitment to higher education.
- Build supportive constituencies for programs.
- Help to build and sustain a critical infrastructure.
- Enhance the credibility of research results.

The features of a successful partnership include:

- Early joint planning of program.
- Multi-year funding at a specified ratio.
- Commitment to stable multi-year funding.
- Commitment to maintaining agreed upon funding ratios.
- Explicit expected outcomes, roles and responsibilities for each party.
- Each partner treating the others as important constituencies.
- Partners leveraging multiple funding sources.
- Joint pursuit of funding and political influence.
- Responsible party designated in each organization for maintenance of the partnership.
- Open access to relevant data and information.
- Respective constituents are well organized.

Recommendations for improving and enhancing mechanisms to support the partnership include:

- Dedicated NOAA staff supporting university programs.
- Independent peer review of current partnerships.
- Creative mechanisms for NOAA/ university scientist exchanges.
- NOAA commitment to 40% of new research funds to universities.
- Learn from and adapt best practices of NSF and Office of Naval Research.
- Regionally based forums for joint planning, relationship building, collaborative problem-solving.
- Improved grants management — borrow best practices; expand to multi-year and multi-task; outsource grants management; on-site grants staff; on-line processing.

Eighteen emerging partnership opportunities were identified with projected benefits for each. Five priority efforts were offered along with benefits and recommended follow up actions:

- Strengthen K–12 (Science, education, public outreach and capacity building)
- Tripartite research opportunities (NOAA, universities and user groups)
- Ocean exploration and observations
- Exploit NOAA data sets
- Accelerate synthesis and wider dissemination of research results.

Follow-up actions require deliberate changes in NOAA business practice, using identified best practices and non-traditional approaches, and increasing the commitment of dedicated resources in support of Science Advisory Board activities and public outreach/education efforts.

Session 2: Future Strategic Direction and Priority Joint Efforts

Session 2 participants had the enormous task of looking at the next 3-5 years and deciding the strategic focus and specific priorities to pursue jointly. The session had the highest attendance of all four workshops and successfully accomplished its complex tasks.

The agreed-upon joint strategic priorities for the next 5 years and the desired results for each include:

1. Integrated Environmental Analysis, Prediction and Services

- Translate weather, climate, hydrographic and ocean forecasts into coastal and ocean ecological and economic forecasts
- Forecast extreme environmental events (natural and man made)
- Forecast air quality and associated impacts.

2. ***Understand, Value, Conserve and Manage Natural Systems***

- Valuation of ecosystem goods and services
- Recover and protect habitats and species with emphasis on biodiversity
- Implement ecosystem-based management

3. ***Education—Establish Environmental Literacy***

- Fully implement Byrne Report recommendations on university extension related to NOAA's mission
- Improve public's response to natural hazards
- Create climate services education programs with the universities
- Improve coastal watershed management through targeted education
- NOAA and academia work together on common educational goals, including Minority Serving Institutions.

4. ***Data Management and Dissemination***

- Establish NOAA/University partnership (Cooperative Institute or Consortium) with computer science departments
- Implement one-stop shopping for users—seamless use of NOAA data centers: user friendly portal
- NOAA Grants—include provision for metadata compliance (FGDC)
- Build successful thematic demonstration projects

5. ***Exploration and Discovery of Ocean and Beyond***

- Effectively use existing technology and develop new technology for new mapping systems and sampling systems
- Develop new observing systems
- Discover, understand and (where appropriate) develop new resources (e.g., energy, minerals, biopharmaceuticals, ecosystems)
- Provide basis for management of new ecosystems.
- Develop maps (coastline to deep ocean, habitat, distribution and abundance, GIS and GPS, subsurface, geological, hydrographic)

Participants were also asked to recommend roles for each of the partners in achieving the desired long-term results. Highlights of the suggested roles are:

NOAA Primary Roles

- Provide infrastructure, including platforms
- Provide forecasts
- Provide other mission-related deliverables
- Translate information to management strategies
- Develop responsive budget initiatives.

Primary Academic Roles

- Bring unique mix of academic disciplines to issues (e.g., microbiology or molecular biology)
- Provide undergrad and graduate education—research-based and new knowledge
- Serve as honest broker
- Provide feedback re: state and local issues

Shared Primary Roles

- Experimental and systems design
- Results reporting.
- Information for decision-makers
- Outreach to a variety of publics

Participants noted that the private sector must be in the partnership equation, and it is essential in any/all efforts that all partners be engaged from the planning through execution stages.

Finally, specific strategic opportunities were provided in the areas of integration of social science into the research agenda and provision of useful information to decision-makers.

Recommendations for follow-up include:

Integrating social science into research agenda.

- Understand environmental attitudes, ethics and values
- Understand the impact of improvements in products and services on people and the economy
- Involve social scientists in program evaluation of public policy issues and regulatory effectiveness
- Understand needs and transfer useful information to decision-makers

Understanding needs and transferring useful information to decision makers.

- Identify the key decision makers and understand their needs—know the "markets."
- Sponsor forums for joint learning to understand linkages between science and public policy.
- Use existing networks and sponsor new forums for interactive dialogue with decision- makers.
- Deliver "user-friendly" products tailored to the right scale and market.

The need to clearly link and integrate efforts in analysis and prediction with conservation and management of natural systems was emphasized. The importance of data, public education and outreach and exploring the oceans were all thoughtfully presented for consideration for action by the partnership.

Session 3: Ocean, Atmospheric, Hydrologic Observing, Prediction and Characterization System

Session 3 was the second most attended thematic session with a balanced representation of NOAA and academia. The tasks included clarifying current efforts, identifying gaps and recommending opportunities to bridge gaps and clarify relative roles of the partners. In fact, the session results exceeded plans and expectations and included: the articulation of a long term vision, a decadal goal, possible products and services, roles of the partners, voids/missed opportunities, and identification of top priorities.

The long-term vision of the system, overall goal and possible products and services are:

Vision: Develop a NOAA environmental information service marshalling university-based science and technology and blending NOAA's missions in environmental prediction and stewardship (e.g., short-term warnings and forecasts, climate and global change, sustainable coastal ecosystems, safe navigation).

Decadal Goal: By 2010, implement coupled prediction systems.

- In operational mode for ocean, atmosphere, hydrology, climate variability and change.
- In research mode for biogeochemical systems, ecosystems, fisheries and co-evolution of society and the environment.

Possible Products and Services:

- Allow management decisions on development of environmental stewardship to be based on sound science.
- Provide climate products and services people can use (e.g., crop forecasts, energy usage, water reservoir releases).
- Project what the coast will look like in twenty years and what the climate will be in 50 years.
- Provide skillful ecologic forecasts.
- Predict the outbreak and spread of environmentally related diseases.
- Predict the effects of climate and weather on coastal systems.

The key components of the desired system include:

1. Validated observing and modeling systems.
2. Community consensus on priorities and approaches.
3. Management (including funding) structures to mobilize, coordinate and sustain all of the players.
4. Focus and leverage NOAA's programs and associated university programs.

The relative roles of NOAA and academia in the desired system are:

NOAA

- Serve as the nation's forecaster
- Transition into operational products and services from academic research data
- Tie research to operations, products, climate, and stewardship
- Lead operation of long-term observing systems and large-scale modeling
- Certify monitoring systems
- Maintain and expand role of providing data certification and data access
- Standardize, certify, distribute archive
- Support graduate students (co-op engagement/outreach/ extension) to encourage expedient transfer of academia to operations
- Secure funding
- Integrate intra-agency environmental services
- Take full advantage of partners

Academia

- Play major role in development of systems applications and operations of specific components
- Understand processes, conduct research, and educate
- Provide extension service
- Transfer proven technology to operational agencies
- Maintain broad, changing research agenda
- Create prototype regional observing systems

Participants identified missed opportunities or voids in current activities. Key themes in this area that emerged are:

- Establish focused means to integrate activities between academia and NOAA operational units.
  - Development of a science infusion strategy
  - Development of a data management strategy
- Contribute to a better informed public, including private sector.
  - Establish a users advisory board to advise new administrator.
- Validate and integrate observations and models across multiple disciplines to address issues of importance to NOAA missions.
  - Carbon cycle, global water cycle, coastal weather and climate, coastal ecological health, fisheries, etc.
  - Coordinated experiments
- Develop the NOAA capability to better address uncertainty.
  - Understand causes of and develop plan to mitigate uncertainty
- Establish scientific and technological consensus of priorities via funded, globalized partnerships.
  - Structured workshops
  - Leadership in the international community.

- Establish management structure to build and maintain NOAA/academic cooperative efforts.
  - Co-laboratories

Finally, the priorities for joint follow up and action fall in to the categories of observing, modeling and education. Specifically, they are:

- Development and implementation of a seamless suite of environmental forecast products.
- Establishment of the required global-to-regional observing capability.
- Further develop NOAA/University Centers of Excellence (with distributed co-labs) to provide the necessary S&T transfers and couplings of natural and human systems.

Detailed implementation plans highlighting key actions and entities for follow up are contained in the workshop documentation.

Session 4: NOAA Workforce for the 21st Century

Session participants were challenged to collaborate on shared efforts in training, student preparedness, recruitment, retention, cooperative arrangements, outreach to underrepresented groups and curriculum development.

The session results included recommendations in each area and are highlighted below.

Several recommendations identify opportunities for education and training in the current NOAA workforce and relationships with universities:

- Re-establish funding for the Education Office.
- Include education within strategic plan.
- Identify older assets for loan via RFP.
- Co-locate NOAA employees—use CMER model.
- Expand IPA visiting scientists programs—women/minority focus.
- Establish pre-, post- graduate fellowships in needed areas.

Recruitment and retention strategies were offered for NOAA follow up and include:

- Workforce planning to include all sectors.
- Outreach across all education levels in strategic plan.
- Strategy to focus on NOAA identity.
- Rotational assignments, among line offices and academia.
- Dialogue to understand why people leave/stay.
- Accommodating environment for NOAA visitors.

Increasing outreach to underrepresented groups was emphasized as a recruitment strategy. Recommendations for follow up are:

- Identify, fund, partner with successful models (e.g., SOARS).
- Have Education Office conduct survey of best practices of existing programs.
- Use/recognize mentors from underrepresented groups.
- Talk with White House to review MSI definition.
- Make NOAA supervisors more aware of minority/women programs.

Enhancing the connection between NOAA and universities on student preparedness was the theme of a number of follow up recommendations for building the future workforce. Some suggested actions include:

- More communication between universities and NOAA.
  - NOAA—What educational preparation is needed for what jobs?
  - Universities—level of curriculum specificity needed.
  - Delineate roles—Who should be teaching what?
- Fund students for NOAA critical needs programs.
- Continue COMET, other cooperative programs.
- Encourage universities to broaden training to better meet NOAA needs.

Finally, participants focused on planning and curriculum development and offered a series of recommendations to support development of the "right" NOAA workforce for the 21st Century. They recommended:

- NOAA do long term needs assessment.
- Provide ideal profiles to universities for curriculum expansion.
- Include workforce plan in strategic plan.
- Create pool of employees and retirees for university exchange.
- Update employee skills through academic partnerships.

Conclusions

The co-leads from each workshop offered summaries of their respective sessions in the plenary session. It was clear that several common and linked themes emerged across the thematic sessions. The NOAA and academic partners were very much "on the same page".

The importance of public outreach and education to both the general public as well as decision makers at all levels emerged as a top priority in all four sessions. Furthermore, the importance of data management and dissemination and the need to leverage their use to all parts of the system were asserted as priorities. The need to link the integrated observing and modeling system with environmental prediction, analysis and literacy, and the conservation and management of natural and human systems was emphasized. Finally, ocean exploration and the partnership opportunities it presents were highlighted as a priority by multiple workshops.

An enhanced infrastructure, mechanisms and practices to support the NOAA/Academia partnership were highlighted in multiple sessions. Recommendations included stable funding and staff, creative personnel practices, Centers of Excellence, joint planning, and regional meetings. Additionally, reducing the administrative burden impeding the partnership emerged along with recommendations for improving grants management and the cooperative agreement process.

Follow Up and Next Steps

The co-leads will consider all workshop recommendations and provide the Science Advisory Board with a consolidated and integrated Joint Action Plan by the end of the calendar year. Beeton agreed to remain the focal point for follow on activities.

Summary of Evaluations

Seventy-eight NOAA/Academia representatives attended the conference. Fifty evaluations were submitted. Ninety six percent of the participants rated the overall conference with a rating of 3 or better and seventy six percent offered an overall rating of 4 or 5 (5 = highly satisfied).

Attendees offered recommendations for future forums.

- Send background materials before the conference.
- Provide more time for collaboration and discussion.
- Hold some sort of reception the evening of the first day.
- Limit the agenda and tasking to manageable amount.

Many attendees conveyed appreciation for the opportunity to focus on important challenges and formulate recommendations for joint action.

The full report of the conference is available at **www.nasulgc.org**

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